A Challenge in Supplies for Obsolescent, Spare and Replacement Parts in Operating NPPs: *Counterfeit and Fraudulent Items*

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**KILIC, A. Nesimi**
A.N.Kilic@iaea.org

*For KANG Ki-Sig*

**Nuclear Power Engineering Section**
**Division of Nuclear Power**
Nuclear Reactors in the world

450 in operation

58 under construction

393 GW(e) capacity

Reference: IAEA-PRIS
More than 50% NPPs – 32 years old

Over 25 years more than 330 units
Over 30 years more than 270 units
Over 40 years more than 80 units
Current Supply Chain and Procurement Trends and Challenges in Operating NPPs

- Challenges to sustained long term NPP operations
  - Formal strict quality assurance documentation requirements
  - Potential vendors not familiar with nuclear requirements
  - Obsolescence issue
  - Difficult to apply modern state-of-the-art technology due to long established system and structure

- Demand exists for decades;
- Established, familiar, partner supplier change/decrease in decades
  - Increasing cost
  - Globalized suppliers
  - Counterfeit, fraudulent and suspect items
“He that is of the opinion money will do everything may well be suspected of doing everything for money.”

- Benjamin Franklin

“Opportunity makes a thief.”

- Francis Bacon
CFIs are more likely to appear when

- There is significant financial benefit for counterfeiter;
- Methods or criteria for establishing and verifying procurement requirements are inadequate:
  - The items are difficult to be, or not typically, verified;
  - Procurement requirements (technical specifications) are poorly defined;
  - Urgent replacement of an item is required (schedule pressures);
  - Supplier qualifications are expedited;
- The item is supplied from a single source with unreliable or unverified performance;
- There is a lack of a strong safety culture within the organizations involved.
Trends and statistics

- 140% increase in counterfeits from industrial parts suppliers to US Defense Department (2006 to 2009);
- Value of counterfeits seized in Canada increased by 500% in < 10 yrs. ending 2012;
- EU customs detained in 2012 about 40 million articles of fake goods, with overall value of nearly €1 billion;
- UN estimates that volume of trade in fake goods is more than €200 billion every year worldwide, comparable to the illegal drug trade;
- Electronic parts are increasingly counterfeited;
- Many industries impacted (not just consumer goods);
- Seeing instances at NPPs (reporting of all cases not in place).
CFIs are not likely to be noticed

- Counterfeits may be difficult to detect via standard industrial QA processes;
- The differences may or may not be obvious to a trained eye, but can certainly escape an unsuspecting or uninformed buyer;
- Reporting and detriments are not globally uniform / robust;
- They can go without notice until the part/function is required or needed.
Issue for nuclear safety and sustainability

• Can have safety related consequences during accidents (when components are most stressed) — Regulatory concern;

• Can impact operational safety and plant performance causing unplanned and long plant shutdown to address issues — Owner’s concern;

• Can reduce market players (less profit in making legitimate components);
Examples

Counterfeit (left) and legitimate breaker (right) supplied to a hospital in Montréal
Examples

Legitimate (left) and counterfeit (right) valves. The "L" logo on the counterfeit valve appears to have been added via welding (instead of cast into the valve body) and "cleaned up" with grinding.
Counterfeit valve on left with red hand wheel; legitimate valve on right with gray hand wheel.
The differences are obvious to a trained eye, but may escape an unsuspecting inspector.
Examples

"Suspect Counterfeit"

"Not Suspect"
Examples

- Fuses
- Thermo-Switches
- Registers
- Diodes
- Cooling Fans
- Pressure Controllers
May not be physical... one case

- Shin Kori 3 in operation and 4 reactor under construction
- KHNP reported on 16 October 2013 that control cabling installed during construction of the APR-1400 pressurized water reactors
- Failed flame tests in the event of a loss of coolant accident (LOCA)
- Although the cables did not pass LOCA tests they were approved to be qualified
Cable Falsification in Shin Kori 3 & 4
Example of falsified Equipment Qualification document

- Domestic Test Lab forged EQ document issued by foreign Test Lab:
- Forged contents: Graph of pressure condition
Managing counterfeit and fraudulent items

TECDOC–1169
Managing counterfeit and fraudulent items in the nuclear industry (2000)

Revision : NEW TECDOC
✓ International experience
✓ Programmes, processes and tools
✓ Prevention
✓ Identification, investigation, and disposition
✓ Management, monitoring, and control of CFSIs
✓ Information sharing and reporting
✓ CFSI Symptoms
✓ Examples
CFSI Prevention

- Management responsibility;
- Training;
- Engineering involvement;
- Supplier selection and oversight;
- Procurement management (risk management and identifying procurement requirements).
Supplier Selection Consideration

- Audit original equipment and component manufacturers
- Determine if suppliers have anti-counterfeiting measures and training in place
- Determine if suppliers have appropriate return policies
  - Inspection of returned items
  - Returning a greater quantity than purchased is prohibited
Bid Evaluation Considerations

• Change policies that require selection of the lowest-cost bid

• Incorporate evaluation criteria that addresses:
  • Type of supplier (i.e. internet, broker, authorized distributor, original manufacturer, etc.)
  • Level of experience with the supplier
  • Historical performance of the supplier
Supplier Selection Considerations

- Consider location and take appropriate precautions

Suspected Sources of Counterfeit Electronics in 2008 by Country of Origin

Tools to address CSFIs

- Engineering involvement with procurement and product acceptance, including testing;
- Detailed knowledge of suppliers, reducing use of independent distributors and parts brokers, and supplier audits;
- Identification of ‘at-risk’ procurement;
- Clear & complete procurement requirements;
- Procurement clauses / contract language;
- Bid evaluation processes accounting for CFSI concerns;
- Zero tolerance for vendor counterfeiting;
Tools to address CSFIs (cont.)

- Safeguarding intellectual property;
- Sensitive scrap and disposal policies;
- Thorough receipt inspections;
- Training on recognizing counterfeit parts;
- Procedures to address suspected CFSI incidents, which include OEM engagement;
- Using difficult to counterfeit, positive ID tools on items such as barcodes, RFID chips, holograms, other manufactured-in features;
- Questions regarding CFSI identification methods and programmes within supplier audit checklists;
- Industry databases of incident data.
Thank you!